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THE JOURNAL OF
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PHONOGRAPH RECORDS AS AIDS TO LEARNING

EFFIE G. BATHURST*

The phonograph record is an educational tool of high promise. Many claims have been made for its use in school. It has power, its proponents say, to bring to the classroom the skills of specialists and master teachers, and the voices of great people of history and literature. It can keep them there, giving children an opportunity to benefit from the spirit of some of the world's best statesmen and finest citizens and perhaps to reconstruct vividly events through which they lived. Through the stimulation of well-constructed drama, the phonograph record is a potential source of inspiration for creative activities which children might not otherwise undertake. It offers variety for the programs of schools where equipment is meager, the work conventional, or the teacher inadequately trained. In the form of the radio transcription the phonograph record is often a pleasing extension of the radio program that has been especially useful.

Desire to test these and other claims and potentialities led the New York State Education Department, with a grant of money from the Committee on Scientific Aids to Learning of the National Research Council, to plan a project in the production and trial of phonograph records in rural schools. Dr. J. Cayce Morrison, Assistant Commissioner for Research, had charge of the experiment. Several committees and many individuals helped with the work.[1]

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* The author of this report, at present a member of the Consumer Education staff of the National Education Association, was responsible for conducting the experiment.

[1] A steering committee consisting of eleven members with the Assistant Commissioner for Research as chairman advised on general planning. A committee with Miss Helen Heyl as chairman was appointed to read and approve scripts. Help in checking the accuracy of plans and scripts was

The experiment had three aspects: The production of records adapted to the curriculum needs and experiences of rural children, the character of programs on the records produced, and the trial use of these records in schools. These several aspects of the experiment will be presented in the order named.

I. Problems in Producing Phonograph Records for Rural Schools

This section deals with the production of the records, which required about fifteen months. Major questions met in the production of the records were: What content would be most useful for the recorded programs and what methods of presentation should be used? On what basis should script writers and producer be selected? In what ways could the various types of work be so coördinated that the experiment might be finished in the time allotted to it? How should the money available be allotted and what financial plan should be used? These problems will now be discussed in detail.

CONTENT AND PRESENTATION

The worth of the content that might be chosen for the records and the appropriateness of methods of presentation were recognized as primary factors in the success of the experiment. The chief factors in planning content and presentation were: (1) suitability for the use of rural children, (2) adjustment to improved types of curriculum organization, (3) correlation with New York State syllabi and curriculum bulletins, (4) uniqueness of the phonograph record as a medium of presentation, (5) value for the education of children, and (6) possible educational objectives. For example:

(1) In suiting content and presentation to the needs and interests of country children, real experiences of rural boys and girls were sought. Schools were visited; district superintendents

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given by various specialists of the State Education Department's staff including members of the State Museum and the school library supervisors and by specialists from the staffs of the American Museum of Natural History, the New York State Conservation Department, 4-H Club organizations, and the United States Departments of Agriculture and of the Interior. New York State district superintendents and teachers supplied advice and materials for the development of the records. The author of this report was responsible for conducting the experiment.

and teachers were consulted; accounts of children's school, home, and community activities were secured; and the views of specialists in education and in program production for radio were sought. The information thus gathered was supplemented by studies of educational literature revealing particular needs of rural children and lacks of rural environments in general. The records were then planned to enrich the experiences and activities of children in their active community relationships. The content areas eventually selected for the proposed recordings were: environment, especially the natural and social environment most common to New York State rural schools; English; and regional studies.

(2) The curriculum organization for which the records were planned included a combination of subjects such as history, social studies, geography, and science, that would lend itself to the children's study of life problems and the development of real life activities. In order that the records might be suitable for one-room schools and other rural schools with several grades in a room, it was planned to adapt them for use with whole-school curricular units, in which provision is made for children of different grades or ages to take part according to their varying ability.[1]

(3) The recorded programs were planned for correlation with New York State syllabi and curriculum bulletins. In this way a more uniform trial use of the records could be obtained without upsetting the regular work of teachers and pupils. Such correlation was especially desirable for the one-room school, where the activities of many grades need especial guidance and unification.

(4) Methods of presentation chosen for the recorded programs were such as would be especially appropriate to the phonograph record, and ideas and information that could be more effectively presented by some other medium, such as by the teacher or the printed page, were excluded. For example, lectures and ordinary talks were not used because either can be given by the teacher more suitably than by records, especially for young children. The methods finally chosen were: drama, recorded bird songs, story telling, pupil activity of interest to other

[1] The Department of Rural Education, National Education Association, Organization of Curriculum for One-teacher Schools. Washington, D. C. The National Education Association. 1933.

children, special talks by authors and master teachers, choral speaking, and the reading of poetry.

(5) The value of the records for children was one of the most important considerations in planning the recorded programs. It was suggested that phonograph records could do much for the improvement of teaching when made for that purpose, but that a record useful in the education of teachers would not necessarily be of interest or value to children. The latter was made the prime purpose of the records, and improvement of teaching became an incidental factor.

(6) The following educational objectives were formulated for the records:

a) To increase rural children's appreciation, use, and understanding of their natural and social environments and their desire to take part in community life.

b) To extend the concepts of environment to geographical regions and help pupils understand the effect of geographical influences on ways of living.

c) To increase appreciation of literature.

d) To stimulate children to improve their ability to converse effectively.

e) To bring to rural schools the personalities of many people engaged in familiar and stimulating activities (authors, characters in drama, and speakers on the records).

SELECTION OF TALENT

Selection of talent was determined by the content and methods of presentation desired and the talent available. For part of the records, professional radio writers and a commercial recording company with professional actors were employed. For the others, various plans were tried, such as use of school children, children's writers, and master teachers.

Dramatic records fell into three categories according to the qualifications of their writers. Some of these records were prepared by writers who knew children of various ages, were exceptionally skilled in writing radio drama for children and adults, and familiar with the curriculum of the modern school, writing from facts provided by State Education Department staff specialists in the natural and social sciences. Others were prepared by a writer with special training for his subject combined

with skill, training, and experience in writing artistic stage drama for children. A third group was prepared by authors of children's literature with firsthand knowledge of their subject but no special training in writing radio drama.[1]

For dramatic records, professional radio voices were given preference over those of amateurs, although a few amateurs were used in some records. The question arose as to whether adult voices should be used for children's voices. Except for one record made where children were not available child voices were used.[2]

Script writers, actors, and program director were selected coöperatively by the State Education Department and the producer. Among the problems in choosing actors were: the selection of suitable voices for the parts, and finding adult actors who could work with children including the professional child actors chosen for dramatic parts and the pupils from public schools who were selected for the scripts designed to present exact classroom activities.

From the standpoint of variety in production, a group of dramatic records was made by the Radio Workshop at Syracuse University. The records were made in the University Workshop on temporary discs, which were rerecorded in the New York City studio.[3]

For records whose purpose was to present real school pupils in ordinary school activities, a staff committee voted unanimously, after listening to a trial record, that professional voices should not be substituted for pupils' voices. In two instances, the committee considered it best to have professional narrators, rather than teachers, read the lines of script connecting parts of

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[1] It was intended that some comparison would be made among the records prepared in these ways, but no definite conclusions could be drawn because it eventually proved impossible to give the various records the same type of production and equivalent teaching situations. There was some indication though in the teachers' reports on use and in specialists' evaluations that the three groups of records could be ranked in effectiveness in the order in which they are mentioned. None of the records was reported ineffective, however, and some, even among those less skillfully constructed, were rated highly by certain teachers and pupils.

[2] Adult voices for children's parts in this record were detectable by child listeners, were farcical in some lines, and on the whole gave an impression of insincerity.

[3] Dr. Kenneth Bartlett, director of the Workshop, supervised the work.

the program. They decided too that lines in such records should be presented as narrators' lines and be written in the third person, so as not to give the erroneous impression that the narrator was the teacher.

For master-teacher talks, story-telling and bird-song records, a type of writing and production different from that of the dramatic records and the pupil-activity records was required. No actors or pupils were used. Speakers were selected for the individual contributions which they could make to the school program, and personalities were placed above speech training in desirability. Only one speaker was needed for each of these records. As a trial, in one case an announcer was used to introduce the speaker, but this was decided to be a wasteful use of record space.

COÖRDINATION OF TYPES OF WORK

Many types of work were required for the project. The most important was the writing of scripts, or continuity, for the recorded programs. A wise selection of information for writers to draw on in preparing the various programs had to be compiled. This required reference work and consultation with specialists and the collection of authoritative books for the use of writers and committees. After scripts were written, committees and other readers reviewed them and formulated the additional ideas which they wished the writers to incorporate. When scripts were completed and approved by the committee and other specialists, they were sent to the recording studio, where the program director read them, selected actors, and planned sound effects.

Of the various types of work, that which required most time, planning, and continuous adjustment of schedules was the reading and approval of scripts. Committees needed time to read scripts thoroughly in order that suggestions which they might wish to incorporate from their special fields could be carefully thought out and checked for accuracy. These suggestions worked best when they were confined to fact rather than plot, were flexible, and of a nature that a script writer could adjust to his plan of writing without spoiling the educative value. To secure the desirable kind of script reading, committee members and other readers were selected who were systematic, prompt,

interested in the undertaking, and willing to include the work as part of their regular jobs.

To help give script writers, committees, and producer the largest possible amount of time for their work without delaying unnecessarily the completion of the records, schedules were planned for receiving scripts from writers and submitting them to committees, for receiving suggestions for revision and passing them back to the writers, and for receiving revised scripts from the writers and sending them to the producing company for casting, mimeographing, and recording.

BUDGET AND FINANCIAL PLAN

To aid in estimating cost of production, the records were grouped technically into three main divisions as follows: (1) dramatizations, requiring an average of five actors including child actors as needed for pupil parts; (2) programs by poets, readers, and story-tellers; and (3) re-recordings from recordings made elsewhere. Records of the first division cost the most to produce.

Items in determining the cost of making the records were: method of processing the recordings, size of the records, number of duplicates or pressings, packaging, and shipment. For example, the records were first made or processed on wax discs—an indirect recording process in which reprocessing was required to make a basic disc or matrix, or master record, from which the final disc which the user knows as a 'record' was made. Since the records had to be usable with handwound phonographs, the discs could not be larger than twelve inches in diameter with about nine minutes of playing time. It would have been possible to have used ten-inch records, except that the playing time of a ten-inch record is thought to be too short for well-written dramatizations.

The contract for production was made between the State Education Department and the producing company[1], and the terms were based on facilities and talent for producing the records planned, rather than on price alone. Thirty-eight different records were made and one hundred duplicates of each were produced. Arrangements were made for the producing company to store the master records for possible production of addi-

[1] World Broadcasting Company (Sound Studios, Inc.), New York City.

tional duplicates in the future, and the duplicates produced were shipped from the company's factory direct to the district superintendents whose teachers would use them.

II. The Records Produced

To reach maximum efficiency, the school curriculum needs an amazing amount of variety, stimulation, and enrichment of many kinds. The thirty-eight phonograph records produced for this experiment are planned for the enrichment of the rural-school curriculum. Eighteen records called the Environment group are based on the social and natural environment of rural children of New York State; fourteen are in the field of English, some with a New York State background; and six are known as the Regional studies group and are related to ways of living in different geographical regions. A list of the records is included in this section.

TYPES OF PROGRAMS

The Environment group includes three separate series, of which the first is entitled "We Build a Nature Trail." In this series, dramatic effect particularly was desired and the purpose of each record was to start children to undertake activities in the enjoyment and use of the natural and social environments. The series illustrates a school situation with teacher and child characters, but is recorded, not by teacher and pupils, but by child and adult actors. Episodes are drawn from the real experiences of children in building a nature trail and a classroom museum[1] and supplemented by factual information supplied by specialists in the State Conservation Department and the State Education Department including the State Museum. This series of ten records employs the same actors throughout and contains a single theme, as in a radio serial, but each record is also a unit in itself. The series is designed for use in one-teacher schools, particularly where several grades work together on a single unit that draws on social studies and natural science for factual content.

[1] The school 'nature trail' was developed by the pupils of the Center School, Wilton Township, Connecticut, with the supervision of Mrs. Edith Parmelee, one of the teachers. The 'museum' was based on incidents supplied by Miss Loretta Freebern, North River, New York.

The second series of the Environment group of records is entitled "Making Better Use of Nature." It is a series of six dramatizations of social problems in the conservation of natural resources worked out with child characters with parts taken by child actors. Series II differs from Series I in that there is no connection between the separate records in Series II, there is no central theme for the series as a whole, the characters and setting change from record to record, and except for the first record no attempt is made to illustrate a school situation.

The third series of the Environment group consists of two records in which Professor Arthur A. Allen, of Cornell University, ornithologist, tells how to distinguish and identify wild bird songs and calls. His master-teacher talks are interspersed throughout with the actual bird songs which were recorded in woods and fields.[1]

The English group of records is a mixed series planned primarily to increase appreciation of literature and to help pupils to improve their conversational ability. It contains talks by authors of children's literature, the reading of poetry, a talk on creating poetry, some dramatizations, story-tellings, and choral speaking.

Three of the records in the English group were produced by school children—one, "Reading to Others," by a group of primary pupils from rural schools and two on choral speaking, "Enjoying Poetry Together," by a fifth-grade class of the Horace Mann School of Teachers College, Columbia University. The first is intended chiefly for the use of primary pupils. Three children from Cambridge Union Free School, New York State, and two from a one-room school near Cambridge did the reading. The choral speaking records were planned and developed by Miss Mae O'Brien, teacher of the pupils. Miss O'Brien brought to the task both training and experience in the teaching of choral speaking. The records are made for the purpose of helping child listeners (1) to enjoy the poems which the pupils recite, (2) to think of ways of interpreting poems themselves, and (3) to understand that children like themselves can interpret poetry and enjoy reciting it. Miss O'Brien planned her teaching procedures tentatively, keeping temporary recordings and steno-

[1] The songs were recorded by the late Mr. Albert E. Brand and by Professor P. P. Kellogg. Dr. Kellogg also assisted in the making of the records.

graphic reports of ways in which she and the children studied certain poems and learned to read them together, giving them original interpretations. Her account of the work is included in *Phonograph Records as a Aid to Learning: A Handbook for Teachers*, the general report and teachers' manual for use of all records produced, published by the State Education Department.

The third group, the Regional Studies records, consists of dramatizations of country life in different geographical regions of the United States. Child characters are used and the purpose is to lead listeners to see some of the relations between geographic influences and children's ways of living. These records represent a way of presenting social themes which is not possible by books, by the teacher, or by any other method except the radio, the talking movie, or the stage. The writers planned plots and wrote the dialogue, attempting not actually to tell the facts as the teacher or a geography book might tell them, but to bring them out in ways of living, dramatized.

GENERAL CHARACTERISTICS

In building the programs of the records the script writers and other contributors worked for educative qualities, effectiveness of construction and production, listener appeal, and usefulness with respect to the curriculum. Later, when the records were tried in schools, each teacher was asked to report on the points mentioned, and questionnaires were used to obtain data for the evaluation of the records on the basis of the children's responses. Accompanying the questionnaire was a sheet that explained how the programs were constructed and how the several qualities were to be evaluated by teachers. For example:

Educative qualities.—All records were designed primarily to stimulate children's interest and to lead to desirable learning activities: to this end the greatest care was given to selection and presentation of factual content. Each record is constructed from the point of view of adding to the children's happiness or to the wholesomeness of their outlook on life or ways of living. Topics which are likely to be emotionally or psychologically disturbing to young pupils were avoided. Only two records are exceptions to the general plan of construction for use with curriculum units in which all grades can work together with each child or grade contributing in proportion to age and ability.

These two exceptions were made for primary grades and advanced grades, respectively.

In keeping with their art and training, script writers of dramatic records aimed to portray characters naturally and to present educational situations appropriate for the modern curriculum, giving listeners examples of other children's planning in groups and working coöperatively, as well as suggestions for individual activities and individual responsibility so necessary to the development of democratic ways of living. Standards and ideals of living presented in all types of the records are those which children, rather than adults, appreciate and value. Moral standards of adults which would not be understood by children or which might lead to insincerity or priggishness were avoided. Attempts to moralize were also avoided and an effort was made to incorporate desirable standards and ideals without preaching.

That some of the ideals were accomplished is shown by reports from teachers in which such qualities as the following were commented on: "There were many opportunities to teach citizenship and courtesy." "Children liked the dialogue and naturalness of the situations." "The objectives were achieved without preaching." "The children have changed their outlook on school life since they have had the records." "We were impressed by the good sportsmanship shown in the record." "The records made us think of more interesting things to do than we had time for." "It was our most profitable year and the records were responsible." "Listening to a good club meeting is an experience these children could have only by means of a record." "After the record we organized our safety club." "To us the record suggested that we take a census of the plants we find on our field trips."

Effectiveness of construction and production.—Themes of records and series were developed simply and clearly and, with some exceptions, the overcrowding of records with facts was avoided. Vocabulary and concepts were kept simple. Numerous fades and transitions and elaborate sound effects were avoided. In dramatic episodes an effort was made to have the acting sincere, natural, and convincing; to have speech, diction, and colloquialisms contribute to the accurate portrayal of characters; and in other ways to place honest production before the pupils.

Examples of comments from teachers on effectiveness of construction and production were: "We enjoyed the conversation, especially the humor." "We thought the dramatization excellent, as it held our attention throughout." "We would like to buy this record, as children like to hear it again and again." "Children were simply delighted with the characters and acting." "You could hear a pin drop all the time the record was playing." "Too many facts were presented on this record, some were lost." "The reader ought to have had more fun in her voice."

Listener appeal.—In keeping with plans and objectives, an effort was made to write the programs of the records so that they would be related to country children's experiences and have appeal for rural pupils; and whenever possible, without distorting situations, to include something of interest to the pupils of at least three maturity levels.

One of the qualities which appear to increase the appeal of any kind of curriculum material for children is humor; not adult humor, but a fairly obvious, child-like humor, grotesque, common, absurd, but not unwholesome. The script writers who had the rare ability to handle this type of humor incorporated it into their writing for the records. Another quality which is reported to have appeal in radio programs and in literature for children is that of surprise; related to it is the quality of suspense. On many of the records these qualities are outstanding.

Examples of teachers' comments that illustrate the above points include: "Experiences of children on the record were like ours." "The children enjoyed hearing the bird songs with which they are already familiar." "We were studying wild life and conservation; pupils could appreciate the humor." "There was too little humor on this record, the children liked 'On the Trail at Night' better." "Even the first grade enjoyed the humor, their little faces were covered with smiles." "The pupils liked the child characters."

Usefulness.—The records were planned to supplement, but not to replace any part of the regular school curriculum. They should be used as one of four major types of materials which aid in the development of curriculum activities; namely, (1) the environment and community resources; (2) books and other printed information; (3) pictures and other visual and objective

material; and (4) radio and phonograph records. The records were planned to add interest and enjoyment to ordinary lessons and to stimulate discussion and further study or other activities. They are not intended to suggest anything new or different from the commonly accepted ways of good teaching. They are intended particularly to be used as a way of presenting ideas which can best be presented through the medium of 'sound.'

LIST OF RECORDS

Environment

Series I. We Build a Nature Trail—Mr. and Mrs. Frederick Gilsdorf
- Record 1. Mr. Acorn's Woods
- Record 2. Making a Map of the Trail
- Record 3. Where Are the Beavers?
- Record 4. Beaver Creek Nature Club
- Record 5. On the Trail at Night
- Record 6. Mr. Acorn's Pine Trees Die
- Record 7. Fire at Beaver Creek
- Record 8. That Hawk's Not Guilty
- Record 9. Taking the Woodchuck's Picture
- Record 10. Grand Opening of the Trail and Museum

Series II. Making Better Use of Nature
- Record 1. We Plan a Forest—Dr. Robert A. Greene
- Record 2. Good Friend, Bad Foe—Dr. Greene
- Record 3. Hired Men without Pay—Dr. Greene
- Record 4. Price of the Dogwood Bouquet—Dr. Greene
- Record 5. What the Soil Can Give—Mr. and Mrs. Gilsdorf
- Record 6. "Water!"—Mr. and Mrs. Gilsdorf

Series III. Do You Know the Birds?—Dr. Arthur A. Allen
- Record 1. Bird Walk
- Record 2. Bird Songs

English

Series I. Stories and Poems We Like
- Record 1. How I Make My Books—Miss Dorothy P. Lathrop
- Record 2. Writing a Book—Mrs. Erick Berry Best
- Record 3. Books about New York State in Early Days—Miss Gretchen Westervelt
- Record 4. Books about New York State Today—Miss Westervelt
- Record 5. Tall Tales of New York State—Dr. Harold W. Thompson
- Record 6. A Holiday Story of Old Albany—Dr. Thompson
- Record 7. New York State Weather Lore—Dr. Thompson
- Record 8. Reading to Others—Miss Mary K. Lenney and Mrs. Helen Buckley and Pupils

Record 9. Poetry with Interesting Sounds—Mr. B. J. R. Stolper
Record 10. Poetry You Say to Yourself—Dr. Hughes Mearns
Record 11. Enjoying Poetry Together (A)—Miss Mae O'Brien and Pupils
Record 12. Enjoying Poetry Together (B)—Miss O'Brien and Pupils

Series II. Everyday Conversation

Record 1. Manners and Courtesy—Group of Dramatized Episodes
Record 2. How Do You Tell a Story—Miss Anna C. Kennedy and Miss Ruth F. Evans

Regional Studies

Series Title: How Country Children Live

Record 1. Peter Starts a Dairy Herd—Mr. and Mrs. Gilsdorf
Record 2. Bob's Year in Wyoming—Mr. Charles F. Finger
Record 3. Rain in the Hills of Vermont—Miss Carnelia Meigs
Record 4. The Good Ship Cranberry—Mr. and Mrs. Gilsdorf
Record 5. The Corn Belt Boy—Mr. and Mrs. Gilsdorf
Record 6. Irrigation Ditches—Mr. and Mrs. Gilsdorf

III. Trial Use of Records in Rural Schools

Does the use of phonograph records in school justify the claims made for them? Are they effective when derived from children's experiences and the usual curriculum content? This section describes the trial use and evaluation of the thirty-eight phonograph records listed above.

Although the purpose of the second part of the experiment was to evaluate the records and find out how teachers would use them, in planning the experiment as a whole, other questions arose on which the trial use also furnished data. A year was allowed for trying the records and writing the reports of the project.

Selection of Schools and Teachers

In the selection of schools, three considerations were stressed: (1) each school should be a rural one, particularly a one-room school; (2) possession of a usable phonograph; and (3) willingness of the teacher to report on her use of the records. To locate the schools, a letter explaining the experiment and inclosing a list and description of the records available and standards for judging phonographs was sent to all district superintendents in the State with the request that they notify the Department if interested in taking part in the project. In order to have a

spread with respect to the location of the schools using the one hundred sets of records, no more than three sets were placed in any one supervisory district. Either whole sets or half sets were assigned to each school. The total number of teachers who took part was one hundred seventy-nine. Eighty-five were in one-room schools with eleven hundred seventy-five pupils, and ninety-four were in schools of two or more teachers with twenty-two hundred eighty-seven pupils.

Training of the teachers was reported as follows: Of the teachers in one-teacher schools, twenty-seven per cent had more than three years' preparation beyond high school, fifty-seven per cent had three years' preparation beyond high school, and fifteen per cent had less than three years. Of the teachers in schools of more than one room, forty-six per cent had more than three years of preparation beyond high school, thirty-six per cent had three years' preparation beyond high school, and seventeen per cent had less than three years.

In regard to experience, twenty-five per cent of the teachers in one-room schools had six to ten years' experience; twenty-seven per cent had less than six years; and forty-eight per cent had more than ten. Of the teachers in schools of more than one room, thirty-one per cent had six to ten years of experience, twenty-eight per cent had less than six years, and forty-two per cent had more than ten years.

A variety of phonographs was reported. In one-teacher schools seventy-nine were handwound and four were electric. The earliest approximate date of manufacture was 1904, reported by two teachers. Three phonographs were manufactured in 1930, two in 1938, one in 1940, and the others at dates between 1915 and 1929. The median value reported was $10, the highest $100, and the lowest $2.00. Thirty-three teachers reported their phonographs as playing the records very well, and fifty as playing them only fairly well, while only one teacher reported a phonograph that played poorly. In two-or-more-teacher schools a slightly better grade of phonograph was reported, with a much larger proportion being electric than in the one-room schools.

SUPERVISION

To help the teachers understand the purpose of the experiment and adapt the records skillfully to their regular school program,

mimeographed aids were prepared. These consisted of: (1) a teacher's manual, (2) twelve circulars or curriculum guides for the major activities suggested by the records, (3) mimeographed forms[1] on which teachers could report their evaluation and use, and (4) circular letters and other correspondence as needed. To serve as a partial check on reports of teachers and information secured by correspondence with teachers and pupils, visits were made to selected schools chosen for convenience of location, and children's responses to the records were observed and discussed with the teachers.

EVALUATIONS AND FINDINGS

Three types of evaluation were made. These were preliminary critical reviews by teachers studying in summer schools and by their instructors, analytical reviews by specialists, and teachers' reports on use.

Of teachers studying in summer school, one hundred fifteen reported on the dramatic series entitled, "We Build a Nature Trail." One hundred twelve said they could understand the records, one hundred fourteen said they liked the voices, one hundred six considered the records instructive for children; one hundred fourteen said that the fact that the records were mainly fictitious did not nullify their teaching value, and only two felt that the children would have gained more facts from the records had their content been given in the form of lectures. This group of teachers also gave suggestions for a teacher's manual which were incorporated in the trial manual and also in the printed handbook entitled, *Phonograph Records as an Aid to Learning: A Handbook for Teachers.*

The instructors of the students in this group of reviewers made unusually favorable comments. For example, one wrote: "I played the records to approximately eighteen teachers, and they are all enthusiastic about them. Believe me when I tell you that they are really enthusiastic. . . . "

It was desirable to have more critical reviews of the records than teachers and pupils were qualified to give. Six special-

[1] Forms were based on techniques developed by Evaluation of School Broadcasts, a research and service project of Ohio State University, with permission of Dr. I. Keith Tyler, Director, who also gave advice in the evaluation of the records.

ists were asked to review either samples or whole sets. These reviewers particularly compared series and individual records, made suggestions for revision or for supplementing ideas in the teacher's manual which appeared incomplete or controversial on the records.

Teachers' reports on use constituted the major part of the evaluation. Teachers were asked to report on Form I their teaching situation, giving (1) the number of pupils and their ages, grades, and economic background, (2) the curriculum activities planned or under way, and (3) the condition of their phonograph. They were asked to reply to a number of general questions that arose during the trial of the records. They were also requested to report[1] on Form II the value and use of each record shortly after playing it. The latter report was the most extensive and was made on a form which, condensed, is presented below.

A. Educative Value

1) To what extent did the record help you meet your teaching objectives in different groups?
2) How valuable was the record for giving information, influencing attitudes, stimulating activity?
3) What criticism, if any, do you have of the content?

B. Effectiveness

1) Did the pupils get the main theme, idea, or aim?
2) In what respects was the record most effective?
3) From the standpoint of effectiveness, what criticisms, if any, do you have of the record's construction and production?

C. Appeal to Child Listeners

1) Did the children enjoy the record?
2) In what respects did the record have particular appeal?
3) In what respects was the record lacking in appeal?

D. Usefulness

1) Describe the activity, curriculum unit, or section of the syllabus which was in progress when you used the record.

[1] Accompanying the form for this report was a sheet that explained the basic construction of the records in order that the evaluations might be made uniformly. See also footnote under "Content and Presentation" in Part I.

2) In connection with what school subjects was the record used?

3) About how much time immediately following the record was spent on questions and discussion?

4) Describe any activity or curriculum unit which the children started as a result of listening to the record.

5) Would some other means of instruction, such as a textbook, an excursion, or a specialist have accomplished the purpose for which the record was used and would such means have been possible in your school?

6) In the list below, please check the uses which you made of this particular record. Add other uses.

On all items that admitted of rating on Evaluation Form II, two-thirds of the teachers, roughly speaking, rated all records high, less than a third gave them a medium rating, and about five per cent considered them of little or no value. In some cases where records are rated medium or low, teachers' descriptions of their teaching situations indicated that these, rather than the records, might have detracted from the records' usefulness.

Some facts concerning the number of reports received from teachers are interesting. In the eighty-five one-teacher schools the average number of reports received per record was thirty-six. In the ninety-four two-or-more-teacher schools the average number of reports per record was twenty-four. From teachers in one-teacher schools the lowest number of reports received for any record was twenty-seven and the highest number was forty-four. From teachers in schools of more than one teacher, the lowest number of reports per record was fifteen and the highest was thirty-three. Decidedly the most analytical and constructive reports on the whole were made by the group of teachers in one-room schools. The reports which stand next in excellence, although they were not grouped, are those from two-teacher schools. This fine response from small schools might be due to the fact that the records were constructed with their usefulness to rural schools first in the minds of writers and advisory committees.

"We Build a Nature Trail" was rated more highly than the other series on all points and was followed by more discussion and more activities. Comments in the nature of the following were made:

"We Build a Nature Trail" is their (the pupils') favorite series. They especially like the record, "On the Trail at Night." They have lined a strawberry crate with wire and have it in the brook back of our

schoolhouse. In it they have plants, tadpoles, snails, and fish. We are also trying to make a balanced aquarium. This morning I took the children to visit the game protector. Words cannot tell you how much the children and I have enjoyed these records. (*Mabel Hyzer.*)

Our nature trail and museum are progressing rapidly. The children are immensely interested and have already taken the teacher and pupils of a neighboring district over our trail. . . . It is hard even to give you a hint of the interest and enthusiasm shown by the children in doing this experiment. We correlated our nature trail with every subject in one way or another. . . . There were many opportunities to teach citizenship and courtesy. (*Mrs. Mildred Howard.*)

"We Build a Nature Trail" also contained the best liked records, except for the two choral speaking ones, "Enjoying Poetry Together," which were most popular as reported by teachers.

That the records were useful and contributed both to traditional methods of study and to creative school work and original pupil activity is indicated by such responses as the following:

All the "Regional Studies" records contributed to our study of the United States. We wrote stories of each region and made a large scrapbook illustrated with post cards and pictures of each region. This helped to vitalize geography in every grade.

We played "Tall Tales" as part of a club program for entertainment. "Reading to Others" was part of a reading class for younger pupils. "How Do You Tell a Story" was used to help in preparing a club program in which stories were told. It aroused such interest that we read all of the two books, *Jataka Tales* and *Give Me a River* (from which excerpts were used on the record). "Weather Lore" was played during a discussion of weather in science to stimulate weather observations, and to check on weather sayings of our own locality. The children enjoyed the choral speaking records so much that we played them over and over as entertainment, following the poems in the teachers' manual. (*Mrs. Geraldine M. Lanfair.*)

The following quotation shows adaptations to the program of the one-teacher school:

To meet individual and group needs was fairly simple since a rural school lends itself well to it. Pupils who were absent when a record was introduced could hear it at recess or noon. As the children enjoyed the records, this method was not regarded as depriving them of any privileges. These times also gave ample opportunity for those who wished to replay the records. To repeat the records for the upper grades it was convenient to use them after the lower grades were

excused for the day. In this way the lesson could be fitted to upper grade demands without the necessity of meeting lower grade needs at the same time. (*Ruth Smith.*)

On one occasion, during school, a child heard a bird song which he had heard on the record. He asked if he might play the record at once for he feared he might forget the notes of the song and not be able to recognize it at a later playing. He was allowed to play the record quietly while classes continued. He identified the bird. (*Fern I. Wood.*)

Teachers' reports on ways in which they used the records are published in the *Handbook for Teachers*. They vary from the titles of projects to fairly detailed outlines of curriculum activities to which the records contributed.

Tentative conclusions are warranted regarding the problems which were formulated before and during the experiment, as follows:

In what way and to what extent will phonograph records contribute to the rural-school curriculum? The responses from teachers and children indicated that the records tried were interesting to the children and that they led pupils to undertake worth-while activities and studies, aroused curiosity, and led to reading and new interests. The most frequent ratings were high or medium on the points evaluated.

Will they be successful when played on the small hand-wound phonograph? The answer is affirmative. The real difficulties reported concerned use of auditoriums and central sound systems. No doubt teachers and pupils tended to be adjusted to the machine they had, so that the outcome of the experiment as here summarized should not be interpreted as meaning that the type of machine used is of no consequence.

Will the records be effective when constructed to meet the needs of the rural-school curriculum? The records were constructed for the rural-school curriculum and a majority of the teachers report that most of the records are effective, frequently mentioning characteristics which had been stressed in the construction of the records.

What methods of presentation will be effective for the programs? The experiment shows that all the methods which were used were effective in various ways. The dramatic method seemed definitely to be one of the factors in the effectiveness of the series entitled "We Build a Nature Trail." These records

especially stimulated activity. After using the series, twenty-two one-room schools and four schools of more than one teacher built nature trails. There were elements of drama in the choral speaking records that, also, were very effective. In the programs which employed other methods it is difficult to separate the method from content, voice, and suitability of construction to young audiences, factors which were more uniform in the dramatic records. Granting the superior educative effectiveness of drama, it would seem desirable to expose pupils to other methods, artistically developed, in order to broaden listening interests and abilities. Not all themes and information can be treated dramatically.

The records containing recordings of the actual songs of wild birds, entitled "Do You Know the Birds," employed the master-teacher technique and were useful and effective in connection with natural science lessons. The record, "How Do You Tell a Story," was designed to give youngsters an idea of how they could improve their own story-telling ability, and was reported effective. Primary-school children gained pointers in oral reading from "Reading to Others." Children who listened to "How I Make My Books" became interested in Miss Dorothy Lathrop, the speaker, and in her books and there was a carry-over from the record to their own written work and sketches. "New York State Weather Lore," by the author of "Body, Boots, and Britches," was useful in connection with science classes as well as literature, and started observations of weather and of folk lore. "Enjoying Poetry Together" and "Poetry with Interesting Sounds" started children to collecting poetry which they liked and increased their appreciation of good poems.

What procedures should be followed in evaluating the records? The procedures selected were largely of the free response type. The responses which teachers in one- and two-teacher schools gave in making their reports could scarcely have been more coöperative, analytical, or interested. Since the records were constructed to meet the needs of rural schools, based upon visits to schools and questionnaires to district superintendents and teachers, and directed and supervised by specialists with experience in the preparation of materials for rural schools, a less elaborate trial would probably have been justified.

Tentative conclusions on other questions that arose are that teachers and other users of the records believe that: (1) turning

the record over to play the second side does not seriously retard interest; (2) there is an advantage in having the records on hand so that the teacher can play them for herself before playing them for the pupils; and (3) the records of this experiment should be made available commercially.

The reports* of the experiment consist of: (1) A printed bulletin entitled, *Phonograph Records as an Aid to Learning, Handbook for Teachers,* published by the New York State Education Department. This gives a general description of the most important phases of the experiment and tells how teachers incorporated the separate records into their teaching programs. It constitutes a manual for use of the records of this experiment and other similar records. (2) A typed report entitled, *Experiment in the Use of Phonograph Records as an Aid to Learning in Rural Elementary Schools: Technical Report,* includes accounts of the procedures used in developing the experiment, tabulations of teachers' reports for separate records, and reports on use of the records that were too long and too numerous to be included in the printed report. (3) *Experiment in the Use of Phonograph Records as an Aid to Learning in Rural Elementary Schools: Teachers' Manual and Circulars,* mimeographed, shows the type of curriculum aids provided for teachers who desired help in incorporating the records into the school program. (4) *Experiment in the Use of Phonograph Records as an Aid to Learning in Rural Elementary Schools, Original Materials,* Volume I, "Environment," Volume II, "English" and "Regional Studies," typed, contain copies of correspondence and memoranda that show the type of contribution made by various specialists and committee members to the project, the basic outlines and plans from which the scripts were developed, the original drafts and finished drafts of scripts, and bibliographies.

Plans for making the records available commercially were interrupted by scarcity of materials due to war needs. When the war is over it is expected that all the records will be made available either for loan or purchase.

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* (1) and (2) are on file in the State Library, Albany, in the Office of Assistant Commissioner for Research, and with the National Research Council at 2101 Constitution Avenue, Washington, D. C. (3) and (4) are on file in the New York State Library and in the office of the Assistant Commissioner for Research, State Education Department, Albany, N. Y.

THE DEVELOPMENT OF MENTAL MEASUREMENTS IN AMERICAN COLLEGES AND UNIVERSITIES

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This study is concerned primarily with mental tests rather than achievement tests. To borrow a concept from the physicist, we are dealing with measurements of capacity to do mental work rather than mental work done, with scholastic aptitude rather than classroom achievement. Moreover, our primary interest is not in mental measurements in the elementary and secondary school but rather at the college level, and, at this level, our major concern is not with the experimental and research work of the psychological laboratory in devising and standardizing new mental tests, checking their validity and reliability, etc., but in surveying briefly the main currents and movements which led ultimately to the mental testing of college students and the practical application of these test results for administration, instructional and guidance purposes. Finally, while mentality consists of many aspects and elements other than intelligence, this study is limited rather narrowly to the development of intelligence tests, partly because historically these came first, and partly because more research has been done and more valid results obtained in this field than in the more recent attempts to measure non-intellectual aspects of mentality such as will-temperament, emotions, social adaptability and special aptitudes.

The measurement and guidance movement in the field of education is a development of the past fifty years, brought about primarily by the stress laid on individual differences in the field of individual psychology. A study of individual differences arose out of the work in the psychological laboratory, especially the work of Cattell in Wundt's laboratory at Leipzig in the late eighties. After his return to America Cattell became the great apostle of individual differences in this country. To him also it would seem we are indebted for fixing the word 'tests' as denoting a simple task to be performed by a subject under controlled conditions in the investigation of individual differences. As early as 1890 we find him writing on "Mental Tests and Measurements," reporting the results of tests on students at the

University of Pennsylvania. Here he stressed the necessity for the standardization of methods of procedure and the establishment of norms. In 1894 he began testing the students of Columbia University in their freshman and senior years. The results of these tests for two years were published in 1896. In 1901 Wissler reported some of the results of testing students under Cattell's direction. Thus began the testing of Columbia students under Cattell (1894–1900), a program which continued through the passing years and culminated in the monumental work of Thorndike at Teachers College (Columbia University) in the past three decades. It should be noted in passing, however, that most of the tests used by Cattell were mainly sensory and motor tests of vital capacity, strength of grip, visual acuity, reaction time, pain sensitivity, etc., and would not, therefore, be regarded today as tests of mental capacity, although valuable for other purposes. Nevertheless, they marked the beginning of a movement of individual measurements which led later to intelligence testing and mental measurements in general. This development begun by Cattell may properly be regarded as the real beginning of mental measurements in the colleges and universities in America.

While Cattell was thus actually beginning the testing of college students, although along sensory-motor lines, Binet was working independently in Paris on a concept which was to prove more fruitful in the educational world. As early as 1896 he became interested in the field of individual psychology, sensing the need of measuring the individual. In 1898 he published an article under the title "Measurement in Individual Psychology," in which he clearly stated the problem—"How can we measure richness of inspiration, accuracy of judgment and the general ability of the mind?" The remainder of his life was devoted to the task of finding a solution for the last problem, viz., how can we measure general intelligence? His answer, worked out in association with Simon, was the famous 1905 Binet-Simon Scale, revised in 1908, and again revised shortly before his death in 1911. The Binet-Simon Scale consisted of a series of tests, given to each individual separately, purporting to measure his general intelligence. The results were expressed in terms of the amount of general mental ability possessed by the individual at the time of the test, or what is now designated as his mental age. This

was as far as Binet went. He did not attain to the concept of the IQ, a measurement of the degree of brightness obtained by comparing the amount of a subject's mental development with his chronological age; in other words, the ratio of his mental age to his chronological age. This concept, originally suggested by Stern, was utilized first by Terman in his Stanford Revision of the Binet-Simon Scale in 1916.

Binet demonstrated the possibility of measuring general intelligence and devised a fruitful method for doing so. Following his death in 1911 the perpetuation of his system was carried on predominantly in America. The next decade, therefore, was marked by attempts to revise the Binet-Simon Scale and adapt it to American needs. There appeared in this period the Goddard revision of the Binet-Simon Scale in 1910, revised 1911; the Kuhlmann revision in 1912, revised 1922 and again 1939; the Yerkes-Bridges-Hardwick Point Scale in 1915, revised 1923; the Stanford Revision by Terman in 1916, revised in forms L. and M. 1937; and the Herring revision in 1922. The number of these revisions indicates the tremendous impact made by Binet in the field of intelligence testing.

In addition to these scales, which were largely although not exclusively verbal in character, there appeared in this same period intelligence tests of a different sort in which the subject's response consists of a performance of some sort. Earlier attempts had been made in this direction in several quarters. The Sequin Form Board had been used for mental testing by Norsworthy (1906). Healy working with delinquents at Chicago had used his Picture Completion Tests; Knox, dealing with immigrants at Ellis Island, employed his Cube Test, (1914); and Porteus for classifying subjects in a feebleminded institution devised a series of Maze Tests, (1915). The common element in all of these is that the subject gives a motor rather than a verbal response. The outstanding application of this principle in constructing a scale of intelligence tests in this early period was the Pintner-Paterson Scale of Performance Tests, (1917). This scale, utilizing form-boards, object assembly, picture-completion and the cube test, is so devised that all instructions can be given without language and the subject's responses are, of course, all non-verbal. As a consequence it is especially valuable in testing the deaf and dumb, illiterates, speech-defectives, and foreigners

without a knowledge of English, as well as normal literate English-speaking subjects. Similar to this Pintner-Paterson Scale and incorporating three of its tests was the Army Performance Scale, (1917), devised especially for individual testing of illiterates in the U. S. Army during the first world war. By 1917, therefore, non-verbal and performance tests of intelligence were well established, as well as the earlier mental tests involving a knowledge of language.

So far all of these tests, both the Binet-Simon and the performance scales, were for individual and not for group testing. Furthermore, tests of this type, while widely used in the public schools, especially after the appearance of Terman's Stanford Revision of the Binet-Simon in 1916, were used but very little in testing college students, partly because of the time consumed in individual testing, partly because the content of the scales was not difficult enough for the superior intelligences of college students, and also because the concepts of mental age and IQ, basic in these scales, are not so serviceable in testing adults in general and especially college students. The work in the colleges had to await further developments.

The next natural development was the devising of group tests of intelligence, both verbal and non-verbal. Among the first successful attempts at this was Pintner's Mental Survey in 1917, which in its own day blazed a new trail. The year 1917 also produced the Army Mental Tests—Alpha, a verbal test for literates, and Beta, a non-verbal for illiterates. The administration of these tests to nearly two million men in the United States army firmly established the principle of group intelligence testing and gave a tremendous impetus to the whole testing movement. Consequently, immediately following the termination of the war in 1918 there appeared in rapid succession a number of group tests of intelligence. Among the more important verbal tests were Otis' Group Intelligence Scale, Advanced Examination (1918), for grades V–XII; Pressey's Group Point Scale for Measuring General Intelligence (1918), for ages VIII–XVII; Haggerty's Intelligence Examination, Delta II, like Army Alpha (1919), for the upper grades; and the National Intelligence Tests (1920), which adapted the Army tests for public school children in the upper grades. The more important non-verbal tests of this period were the Otis Group Intelligence Scale, Primary

Examination (1918), for grades I–VI; Haggerty Intelligence Examination, Delta I (1920), like Army Beta, for the lower grades; and Pintner's Non-language Group Intelligence Test (1919), for the upper grades of the elementary school. Thus, in the decade following Binet's death and the 1911 Binet-Simon Scale the main contributions in the field of mental measurements were, first, individual testing of intelligence with scales of the Binet-Simon type, which of course were largely verbal in nature; second, individual testing with performance scales; and third, the development of group testing both verbal and non-verbal. Furthermore, in this period mental tests were administered almost exclusively in institutions, in the U. S. Army, and in the public schools. Intelligence testing of college students was for the most part still to appear over the horizon.

In the next decade—roughly speaking from 1920–1930—intelligence tests and testing grew by leaps and bounds. This surge of interest in mental measurements registered itself at all levels in the educational world—elementary, secondary, collegiate—and gave birth to literally scores of tests of a great variety. Only the main lines of development will be noted here. First, there was a refining of some of the Binet-Simon scales already indicated—the Kuhlmann and the Herring (1922), and the Yerkes (1923). Second, a great deal of emphasis was placed upon non-verbal tests, especially performance tests and scales. In 1923 the Kohs' Block Design Test appeared. The Grace Arthur Point Scale of Performance Tests came in 1925, re-standardized 1928. Then came in succession the Goodenough Man-Drawing Test for young children, in 1926; the Drever-Collins Performance Scale, devised especially for the deaf, in 1928; the Kent-Shakow Graded Series of Form Boards, for use especially with the insane, in 1928; the Merrill-Palmer Scale for pre-school children in 1931, and finally the Cornell-Coxe Performance Ability Scale for general usage in 1934. The number of these will indicate how fruitful was the development of performance tests of intelligence in this particular period. Third, group tests initiated in 1917 and developing rapidly by 1920 reached enormous proportions in this period. Tests such as the National Intelligence Tests for grades III–VIII, (1920); the Terman Group Test of Mental Ability for grades VII–XII, (1920); the Otis Self-Administering Tests of Mental Ability,

(1921), for grades V-XII; and the Kuhlmann-Anderson Intelligence Tests, (1927), for grades I–XII are typical of a prolific growth of group tests in this decade. Fourth, with the development of statistical theory and its application to testing procedures, there resulted an important change in testing techniques; namely, a shifting from age scales to point scales, with the rating of the intellectual status of the individual not as so much mental age but as a score and evaluated in terms of quartile, decile, percentile or standard deviation. This technique has been especially important in testing college students.

If any one year were to be named as the real beginning of the intelligence testing of students in American colleges and universities, that would be the academic year 1918–1919. The Army Mental Tests had already been constructed and had been given to nearly two million enlisted men. The results of this testing program in the army had proved highly successful for diagnosis and classification, and what had been done in the army presumably could also be done in the colleges. Furthermore, these army tests had been devised by a group of psychologists, and the work of administering the tests and interpreting the results was done largely by another group of younger psychologists from the colleges and universities. With the termination of the war in November, 1918, and the return of the psychologists to their academic work at the cessation of hostilities, it was only natural that they should transplant to their respective institutions something of the spirit and the techniques of the testing program of the army. This is exactly what happened. Indeed, in many cases all they needed to do was to continue in their respective institutions work already initiated there as part of the war program, since the army in 1917–18 had organized the S.A.T.C. and the R.O.T.C. in a large number of colleges and had used the Army Alpha Test in these two organizations.

Consequently, if any one test were to be named as the progenitor of the intelligence tests used in American institutions of higher learning during the past two decades, that test would be the Army Alpha. The colleges had at their immediate disposal a group test of intelligence devised especially for adults, one which incorporated material pooled through the American Psychological Association and constructed in its final form by a committee of such well-known psychologists as Bingham, Goddard,

Otis, Terman, Thorndike, Whipple and Yerkes. In addition to the prestige enjoyed by the Army Alpha because of its origin and its successful usage in the army and the standardization resulting therefrom, there was the practical consideration that after the armistice in 1918 large quantities of surplus supplies of the army mental tests were made available for purchase at very nominal rates. Consequently, in the early days following 1918 most colleges and universities that did any testing at all used Army Alpha sometimes along with other tests, but frequently alone.

It was soon apparent, however, that this test was not well adapted for college students. Some of its content was specifically army material with which students might not be familiar. It was also weighted somewhat heavily for men, thereby penalizing women students to some extent. But the most serious objection was the fact that much of its content was entirely too easy for the college level, as a result of which it did not make sharp enough discriminations among the superior intellects of the college population. The net result was that, although college testing began largely with Army Alpha, very soon a movement was under way to devise new tests for the college group, all of these influenced profoundly by the army program, and many of them frankly based upon Alpha as a point of departure.

This evolution can be seen best by tracing the development of some of the more important college intelligence tests. Among these one of the oldest and most outstanding in the field is Thorndike's Intelligence Examination for High-school Graduates (1919), sometimes called the Thorndike Intelligence Examination for College Entrance. Part I of this test grew directly out of Army Alpha. During the early part of the War a committee headed by Thorndike undertook for the Air Corps a revision of the original ten-test Army Alpha. By dropping one test, enlarging and making the other nine more difficult, and adding four additional tests, there resulted the so-called Air Service Intelligence Examination. In the fall of 1918 this test was in turn revised, mainly by shortening, in order to make it more serviceable for the admission of S.A.T.C. students in Columbia University. This resulted in the Thorndike Test of Mental Alertness (1918), which eventually became Part I of the Thorndike Intelligence Examination. Parts II and III were added early in 1919 in order to round out a full-fledged college

entrance intelligence test for students in general. Thus came into being Thorndike's Intelligence Examination for High-school Graduates, a test rather widely used among American colleges in the early twenties, officially adopted by Columbia University in 1919 as part of the entrance requirements of Columbia College and used continuously for this purpose at Columbia ever since. In 1919 Thorndike also produced his Standardized Group Examination of Intelligence Independent of Language. This scale, as the title implies, was non-verbal, and consisted of eight tests derived largely from Army Beta. In difficulty it ranged from second-grade level to that of the superior adult. Although thus reaching the college level, nevertheless it was used but very little in college circles, doubtless because of the extreme emphasis on verbal tests at this level.

Another test used rather widely among colleges at the present time and starting originally from the Army Alpha base is the Ohio State University Psychological Test. In the fall of 1919 Army Alpha was administered to the entire student body of Ohio State University, also to many of the faculty who volunteered to take the test. On the basis of the results obtained it was decided that Alpha was inadequate at the collegiate level, inasmuch as it did not discriminate sufficiently between differences in intelligence. Consequently, a revision which proved to be essentially the construction of a new test was attempted. As a result there came in 1920 Forms 1 and 2 of the Ohio State University Psychological Test. Other forms were devised in various succeeding years, Form 21 appearing in 1940. Form 22 is now in the process of being constructed. This test is a power rather than a time-limit test. Scores are evaluated in terms of percentiles. For some years now it has been officially adopted by the Ohio College Association for administration to college freshmen for classification purposes.

At the present time the most widely used intelligence test at the college level is the American Council on Education Psychological Examination devised by Thurstone. This test appeared first in 1919 as the Thurstone Psychological Examination for High-school Seniors and College Freshmen. It constituted Part IV of a series of six tests for engineering students at Carnegie Institute of Technology. Unlike the two tests discussed above it did not lean nearly so heavily on Army Alpha, but consisted

of fables, analogies, syllogisms, sentence-completion, etc., arranged in what Thurstone called cycle-omnibus form. This test, revised and enlarged, was officially adopted by the American Council on Education in 1924. Since then various forms and editions have appeared in succeeding years, the most important change being made in 1938, and continued to date, when an attempt was made to embody the notion of factor analysis for the isolation of primary traits, advocated in Thurstone's Primary Mental Abilities (1938). Consequently, since 1938, a quantitative and a verbal as well as a total rating is obtained for each student, the raw scores being transmuted into percentile ratings.

Of especial interest from the historic standpoint in this connection are the Otis' tests of intelligence. Prior to World War I Otis had pioneered in devising a group test which remained unpublished. This was donated to the Yerkes' committee which was pooling test material for the construction of the army tests in 1917, so that Army Alpha drew rather heavily from Otis' unpublished work. In 1918 Otis published his Group Intelligence Scale, the Primary Examination for Grades I–IV, and the Advanced Examination for grades V–XII and college. The similarity of these scales to Army Alpha, or *vice versa*, can be seen by noting the sub-tests of the Otis; namely, directions, opposites, disarranged sentences, proverbs, arithmetic, geometrical figures, analogies, similarities, completion and memory. Most of these were also found in Alpha. In his scales Otis introduced the notion of determining the degree of brightness of the individual by his deviation from the norm for his age, called his index of brightness (IB). Tables were also furnished to compute his mental age and his percentile rank. Later editions supplied a table for computing IQ as well as IB. In 1921 Otis published his Self-Administering Tests of Mental Ability, the Intermediate Examination for grades V–IX, and the Higher Examination for grades IX–XII and college. Again in 1936 came the Otis Quick-Scoring Tests of Mental Ability, Alpha for grades I–IV, Beta for grades IV–IX, and Gamma for high-school and college. In both the Self-Administering and the Quick-Scoring editions just noted, raw scores are interpreted in terms of mental age, IQ, and percentile rank. While the three Otis scales described above have been used very widely in the public schools, both elementary and high school, they have been used to only a limited extent at

the college level. Preference at this level has been given to the Thorndike, the Thurstone, and the Ohio State University tests previously mentioned.

Several other intelligence tests that have been used in the college field ought to be noted briefly. One of the most important of these is the Brown University Psychological Examination. Colvin adapted several psychological tests already in use—completion, opposites, definitions, analogies and arithmetic—as a group test for college students. It was first applied at Brown University along with Army Alpha to the S.A.T.C. and to the Naval Unit in 1918. In subsequent years at Brown and at other colleges it was used with regular students for classification purposes. In 1920 Anderson at Yale devised his Freshman Classification Test, a short fifteen-minute time-limit intelligence test for college freshmen. This test was used locally at Yale for a short time and at a few other colleges. Likewise, in 1920 at Simmons College Roback produced his Mentality Tests for Superior Adults, designed especially for college students. This test consisted of twelve subtests, of rather difficult material, and required over three hours to administer. Because of administrative difficulties and the high cost of tests (50¢ per copy) it was confined almost exclusively to local usage. In 1920 also appeared Terman's Group Test of Mental Ability for grades VII–XII. For years this test, along with the Otis Advanced and Higher forms, was regarded as standard in junior and senior high schools, and consequently enjoyed very wide usage at this level. Among the colleges, however, while occasionally used, it, like the Otis, was regarded on the whole as too easy for the highly selected and superior college group.

So far we have considered the most important tests which were used in the early years of college testing, viz., 1918–1920. In the meantime others have been added to the list, but none of these have been widely used in college circles. Only brief consideration can be given to them. First, the Bregman Revision of the Army Alpha appeared in 1925, definitely superseding the original Army Alpha for civilian adults and high-school students but not very serviceable for college students. Second, under the sponsorship of Thorndike, the I. E. R. Intelligence Scale CAVD was published in 1927. In many respects this is one of the best

scales ever produced. In difficulty it ranges from the three-year level to that of the college graduate, thereby furnishing ample material for testing throughout the college level proper. Measurement throughout the scale is in terms of a constant unit, the standard deviation of a ninth-grade group thereby making all scores comparable. Validity and reliability are both high. In spite of its many excellent features, however, this scale has not received the attention in the college world which it deserves. Third is Cleeton's Carnegie Mental Ability Tests (1931) for use with high-school and college students. Fourth, the Henmon-Nelson Tests of Mental Ability for college students, (1932). This test was carefully constructed. Validity and reliability are both high. Percentile norms are provided for each year in college. Fifth, Atwell and Wells' Army Alpha Revised, Form 6, Short Form, (1933), for superior adults, high-school and college students. Sixth, O'Rourke's General Classification Test, Senior Grade, (1935), for high-school seniors and college freshmen. Seventh, Sullivan's California Test of Mental Maturity, Advanced Battery, (1937), for grades VII–XIV. Eighth, Pintner's General Ability Tests, Verbal Series, Advanced Test, (1938). Devised originally for grades IX–XII, this test has been found difficult enough for the college level, especially freshmen and sophomores, correlating highly with Thurstone's Psychological Examination for College Freshmen and the Ohio State University Psychological Test. It is a time-limit test of medium length, requiring approximately an hour of working time. A quick-scoring device is furnished. The raw score is transmuted into a standard score, from which mental age and IQ may be obtained. Among the more recent tests mentioned above, the Henmon-Nelson Tests of Mental Ability for College Students, the Otis Quick-Scoring Tests of Mental Ability, Gamma form, and the Pintner General Ability Tests, verbal series, Advanced test, are the most promising for future use in the college field.

Two individual tests applicable to college students have recently appeared. One is Terman and Merrill's Stanford Revision of the Binet-Simon Scale, Forms L and M, (1938). Each of these forms contains a series of tests on the average adult level and three series for superior adults. The second is the Wechsler-Bellevue Intelligence Scales, published in Wechsler's

Measurement of Adult Intelligence—first edition, 1939; second edition, 1941. This scale incorporates many desirable features. It combines six verbal and five non-verbal tests. Credits are given in points, rather than in months of mental age. The raw score is weighted and evaluated in terms of standard deviation. Norms up to age 60 are provided. The IQ may be computed not, however, on the basis of mental age, but directly from the weighted score. A table is also provided by which IQ's can be transmuted into EQ's for older subjects.

At the present time the best and most widely used group tests of intelligence in the college field are the American Council on Education Psychological Examination by Thurstone, the Ohio State University Psychological Test by Toops, and Thorndike's Intelligence Examination for High-school Graduates. Occupying a second place but probably of increasing importance for the future are the Henmon-Nelson Test of Mental Ability for College Students, the Otis Quick-Scoring Test of Mental Ability, Gamma, and the Advanced Test of Pintner's General Ability Tests, Verbal Series. Individual tests are limited to two, forms L. and M. of the Stanford Revision of the Binet-Simon, and the Wechsler-Bellevue Intelligence Scale.

In the development of the measurement of intelligence traced above certain tendencies appear. The movement has been, first, from verbal to non-verbal and performance tests; second, from individual to group tests; third, from mental age to point scales, with the final mental level of the individual stated in terms of a score and evaluated in terms of percentile or standard deviation rather than mental age and IQ; and, fourth, from the measurement of general intelligence to the measurement of the constituent elements of intelligence or primary mental abilities. There is another tendency not outlined above, viz., from the measurement of intelligence to the measurement of non-intellectual aspects of mentality and the personality as a whole.

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THE EFFECT OF EYE ABNORMALITIES ON READING DIFFICULTY*

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Most teachers observe that many of their students fail to learn to read according to their age or grade expectancy. Somehow they are unable to make sense out of much that they read. Even words understood when spoken may be misread; and this happens particularly when different words look alike. Some fail to grasp the meaning of phonetic markings for guiding their pronunciation, while others seem to pay no attention to the instruction in pronunciation. There are thousands of such children with reading disabilities, although reading difficulties vary according to social stimulation in different cultural groups and in school opportunities. The retarded groups are large and make up from eight to twenty-five per cent of the total school population.[1] Many first-grade children—from ten to forty per cent—fail to pass their grade because of inadequate reading achievement. In grades II and III, fifteen per cent are unable to read the required material. In grades IV, V, VI and VII, about thirty per cent have difficulty in following the reading program. This information is gained from an authoritative source as shown by a survey of about twelve thousand pupils in a large city. But such inability to read does not end with the school years. At present public attention has been directed to the difficulty in reading experienced by so many men entering the army or other branches of our military service. As a result of such limited ability to read, many of these men fail to pass important and necessary tests for classification and promotion.

When in a previous paper, "The Relationship of Various Eye Conditions and Reading Achievement,"[2] there was shown a definite relationship between reading achievement and eye conditions existed, it was not assumed that all reading disabilities can be explained by abnormal eye conditions, nor was it maintained that correcting the eye conditions necessarily alleviates or corrects every difficulty.

* We wish to thank Dr. A. J. Carlson and Dr. A. C. Ivy for their interest and suggestions in this study.

With a group of two hundred twenty-five children, selected at random, it was demonstrated that abnormal peripheral ocular variations were concomitant in direct ratio with low reading skill or efficiency. It was found that the greater the reading ability, the fewer the abnormal eye conditions. In other words, so far as the over-all influence of the abnormal eye conditions is concerned there are many more children with severe or complex abnormal eye conditions who were poor readers than there were children who had difficulty with reading while having relatively perfect eyes.

Any specific function such as vision can hardly ever be considered the sole causative factor in reading difficulty. Undoubtedly there are many variables in such a complex achievement as reading, and it should not be assumed that any one function can be singled out and considered as the causal factor. It is obvious that there are many factors in reading difficulty, and any one will affect or change the total complex function of reading dependent upon the ability of the individual to adjust himself to any abnormality which presents itself. It is probably the approach to a normal degree of stability and integration of all physiological and mental functions which brings about good reading, and the degree of integration is in turn dependent upon the normality of all the various organismic activities.

In such a complex task as reading, the child must be considered as a whole, including all the functions when making a diagnosis of reading difficulties, such as, general health, emotional stability, endocrine functions, nervous equilibrium, family and cultural background and the methods and quality of teaching employed; as well as the child's vocabulary background, personality traits, motives and interests, and his feeling concerning his reading difficulty.

Previous studies showed that abnormal eye conditions in general form a factor in reading difficulty. Now are found specific influences of abnormal eye conditions upon reading difficulties. This is done with full knowledge of the complexity of the entire problem and it is hoped some understanding of the influences of these specific factors will be furnished.

As may be expected with this complicated problem, there are a variety of opinions and data reported among various educators, child psychologists and ophthalmologists as to primary influences.

Clark[3] found little correlation between faulty visual function and reading disability. This he explained by the fact that the visual function is only one of the basic factors; and that some children can compensate for visual handicaps and become good readers in spite of them. Goodsell[4] did not find any significant correlation between reading grade placement and visual efficiency as judged by acuity, refractive error, muscle balance, and fusion. He gives an r of .08 for one group, and .15 for students from several schools up to the sixth grade. He also found that improvement in visual efficiency by means of the metronoscope did not materially affect a student's reading grade placement. However, Peter[5] maintains that, although correlations between reading ability and visual functions are not very significant, it appears that visual disability may retard reading achievement and that improvement tends to follow its correction.

Some of the most extensive and best controlled studies reported in the literature have been carried out by Eamen, Imus, Rothney and Baer. Eamen[6,7] made several comparative studies of the ocular characteristics of unselected children, and children with reading disability, and found that the reading difficulty cases had more eye trouble than the unselected group. Out of one hundred reading disability cases and one hundred forty-three unselected school children he found incoördination of the eyes the most prevalent and, of those, exophoria was the most predominant in both groups, but more so in the reading disability group. Next came hyperphoria; then mixed dominance; and last low fusion. Of the reading disability group, sixty-nine per cent had poor eye coördination at the reading distance as against twenty-two per cent for the control group. Similarly, forty-four per cent had low fusion at the reading distance in the reading difficulty group while this was present in only eighteen per cent of the other group.

Imus, Rothney and Baer[8] examined six hundred thirty-six college students for refractive errors, motor anomalies and aniseikonia, and correlated the results with reading ability and academic grades. Thirty-six per cent had eye defects. Although correcting their defects did not completely eliminate the reading disability; eighty-three per cent of them improved when correction of the eye defects was combined with remedial reading and drill for speed and comprehension.

PROCEDURE

The subjects of this study were a group of two hundred twenty-five unselected Chicago city school children, ranging from the first to the eighth grade. Each child received a fairly complete eye examination consisting of a vision test without cycloplegic, a homatropine refraction, phoria, duction, and fusion tests for twenty feet and for the reading distance.

To facilitate the scoring and correlating processes, each eye defect or, in other words, each deviation from the normal was arbitrarily assigned a value of one point. For example, if a student had low vision in one eye, an exophoria for near, and poor adduction for near and distance, the student received four points. The more defects found in the examination the higher the score. Zero represented a completely negative examination, while 14 was the poorest score possible. This simple method of obtaining a total score of visual defectiveness was used because of the difficulty of combining into a single score the quantitative measurements of several different types of defects.

After completing all the eye examinations the school furnished the records from the City of Chicago reading tests, and the mental age score for every child. Thus at the time of the eye examination a child's reading accomplishment and intelligence quotient were unknown to us.

The reading scores as furnished by the school were in terms of grade equivalents, and, since this kind of score is influenced highly by intelligence, they were converted into scores of mental age expectancy. This was accomplished by dividing the reading scores, in terms of grade expectancy, by the grade level according to the mental age. This was necessary because otherwise, considering any two students with equal reading retardation, one subject might be truly a poor reader in the sense that he was not reading up to his ability, while the other might actually be doing the best that he could. Thus the measurements of the reading achievements were made in terms of what an individual could be expected to do according to his ability or intelligence and not just according to his grade level. These scores were then correlated with the eye scores for the group as a whole and for various grade levels; also various eye abnormalities such as refractive errors, phorias, poor fusion and duction weakness,

were singled out and correlated with reading achievement. As a check a correlation between the reading scores in terms of grade equivalents and eye scores was also calculated. Since low eye scores indicate good eyes while a low reading score indicates a deficiency in reading accomplishment, all r's must be negative which show positive relationship. All correlations presented in Table I are negative r's. However, since negative correlations usually signify inverse relationship, these r's are presented without the minus sign in order to prevent confusion in interpretation.

RESULTS

By thus transforming the grade equivalent reading scores into mental age expectancy scores, the range for the total group goes from the lowest score of 28 to the highest of 156, with an average of 80.24. The correlation between these reading scores in terms of mental age expectancy and eye scores was .465, while eye scores and reading scores in terms of grade equivalents was only .161. This latter r agrees with the r reported by Goodsell and also with the findings of Peter, who says that correlations between reading achievement and visual function are not very significant. But in spite of the apparent low correlations he feels that visual disability may retard reading achievement. Here is probably the clue to some of the contradictory findings. Some children are not working up to their mental age level while others do the best they can. Any reading achievement score which fails to take this into consideration will tend to give a low r. Also, very intelligent children may be able to meet the requirements of their grade level in spite of an eye abnormality, while a child not so bright may have real trouble.

Table I gives the correlations between reading scores in terms of mental age expectancy and various eye factors. The first r (A) is for the group as a whole and the total eye factors; the second r (B) has been computed from the data of those children who required glasses or whose glasses needed changing, while the third r (C) is from the children who did not need glasses. Of these three correlations, the third indicates the best relationship while the one for the children needing glasses shows the least correlation. Refractive errors seem to have a smaller influence on reading difficulty than some other factors such as

TABLE I.—CORRELATIONS BETWEEN READING SCORES (MA EXPECTANCY) AND TOTAL EYE SCORES AND BETWEEN READING SCORES AND FOUR EYE ABNORMALITIES

Variables	r	P. E.
Reading scores and total eye scores	.465 A	∓.040
Reading scores and eye scores of those needing glasses	.243 B	∓.075
Reading and eye scores of those not needing glasses	.516 C	∓.041
Reading and eye scores of those with exophoria	.631 D	∓.049
Reading and eye scores of those with esophoria	.422	∓.101
Reading and eye scores of those lacking binocular vision	.226	∓.130

exophoria which gave a correlation of .631 (r-D) and duction weakness as will be seen later.

According to general observations it seems that as a rule monocular individuals have less trouble with reading, at least as far as their eyes are concerned. These findings bear out this observation. Absence of binocular vision gives a small and unreliable correlation between the eye and reading scores. It apparently is the interference resulting from a poorly functioning binocular vision which causes interference in the process of reading. This is probably because in order for one to see one object clearly with both eyes, fusion and good binocular integration must exist. For this to take place, the clear vision images in the two eyes must fall on their respective foveae without any undue muscle strain. When the neuromuscular mechanism of the two eyes becomes disturbed so that the two eyes no longer function as a unit, the resultant interference seems to become a disturbing factor in the process of reading. Since the process of reading, or particularly the process of learning to read, is in itself a very complex activity, it requires normal and efficiently functioning sensory mechanisms, good intelligence, attention, and reasonably good motivation. Anything which

impairs these variables may become a disturbing factor in reading, but it is evident that these variables are not of equal importance.

Since the data from those students with exophoria and adduction weakness gave the highest correlation between reading accomplishment and eye scores, an analysis of the data from duction measurements alone was made. For this analysis all the duction measurements were scored separately and these scores for the whole group were correlated with the reading scores. The results are presented in Table II.

TABLE II.—CORRELATION OF READING SCORES WITH DUCTION WEAKNESS FOR THE ENTIRE GROUP

Variables	r	P. E.
Reading score and total duction score	.647	±.025
Reading score and fusion amplitude*	.380	±.040
Reading score and fusion return**	.451	±.036

* Fusion amplitude which is determined by duction measurements is recognized by the appearance of diplopia.

** Fusion return is recognized when the diplopia becomes a single image again.

This condition is easily demonstrated with the prism duction test where increasingly stronger prisms are given until fusion breaks and diplopia appears, and then by diminishing these prisms until fusion is recovered, at which time we have a single image again. Frequently both of these points are below normal, but sometimes fusion amplitude may be within normal limits while recovery is so poor that the strength of the prisms has to be brought back to zero, or almost so, before the subject is able to see the images as one again.

Duction weakness produces a significantly high correlation with reading disability giving about the same size r as the correlation with exophoria. There is, then, a definite relationship between duction weakness and reading disability, the r's being significant for the fusion amplitude as well as for the point of recovery. This finding is very important, since there is a tendency to underestimate the influence of abnormal ductions, especially if these deviations are small. Studies on the influence of eye dysfunctions on reading disability have hitherto neglected

to test for weak or abnormal ductions. It is especially important to know if poor recovery from diplopia exists. At least, the experience with students with poor reading achievement has been that they frequently showed poor duction ability, and particularly a retarded ability to recover fusion once diplopia appears. Such a condition indicates a low ductional reserve and tends to cause undue fatigue and also prevents the eyes from efficiently making the fusional responses and adjustments so necessary in getting single and clear binocular vision. If this process is not accomplished efficiently, the two images have a tendency to fail constantly to remain on the two foveae, and as a result there is blurring of the images or even potential temporary diplopia. In order to prevent this, an unusual amount of energy is needed for the constant adjustment required in bringing the two foveal images into one single image. Now, given a child who is just learning to read, which in itself is a task that requires all available energy and attention, it is clear that any additional effort needed for the mere act of seeing may become a serious handicap in the process of comprehending and learning the reading symbols. All this can happen even though the vision may be normal or may have been brought to normal by a perfect refraction. Thus, in a study of the ocular influences upon reading abilities, glasses should not be considered alone without considering the various other peripheral ocular mechanisms concerned in the whole visual process.

Glasses, however, can influence reading adversely, that is, glasses which have been poorly fitted. We found five students who wore glasses which were very badly fitted according to the refractive findings at the time of the examination. Every one

TABLE III.—READING SCORES AND EYE SCORES OF STUDENTS WITH POORLY FITTED GLASSES

Reading Scores	Eye Scores	Student's Grade
.58	10	8
.28	11	3
.54	12	2
.69	10	1
.54	12	8

of these children had low reading scores; in fact, the pupil with the lowest reading score of the total group of two hundred and twenty-five was wearing glasses which fitted improperly. Since only five students were found with such poor refraction, no correlation was calculated between their reading scores and eye scores. Instead, the actual data are presented in Table III.

Sometimes the question is raised as to whether reading disability varies through the different school years or whether it increases or decreases as the child progresses in the grades. Do non-readers tend to get better as time goes on or do they get increasingly worse as reading requirements become greater as they advance to the higher school grades? Moreover, it is important to know at what grade level non-readers appear. Is it possible to measure quantitatively reading disability and its relationship to eye problems in the early part of a child's school career, or can it be detected only after a few years of unsuccessful reading? We have made some relevant observations upon the maturation of visual function as presented in the lower grades in answer to these questions.

TABLE IV.—CORRELATIONS OF READING AND EYE SCORES FROM CHILDREN OF VARIOUS GRADE LEVELS

Grade Level	r	PE
All grades	.465	±.040
Grades I to IV inclusive	.519	±.050
Grades V to VIII inclusive	.554	±.058
Grades VII and VIII inclusive	.381	±.057
Grades I and II inclusive	.619	±.054

Table IV shows some of the correlations between reading and eye scores from children of various grade levels. There seems to be little significant variation from grade to grade unless we compare the first and second grades with the seventh and eighth. Reading difficulty and eye problems show a slightly greater relationship during the first and second school years than during the seventh and eighth. However, if we divide the total group into two sections consisting of the four lower grades and the four upper grades, the correlations are practically the same.

Thus we may say that there is probably little difference between the relationship of eye problems and reading difficulty as the children mature physically. There is no evidence that students outgrow the effect of eye impairments in reading efficiency as they progress in their school careers. It would, therefore, be particularly important that possible corrective measures be initiated as early as possible. The data here presented give no evidence that school work increases the number of cases of eye abnormalities during the elementary grades.

SUMMARY

1) There appears to be a definite relationship between eye abnormalities and reading difficulty.

2) Various eye difficulties show different degrees of influence on reading ability. Exophoria and duction weakness showing the greatest, while the need for glasses seems to show less influence.

3) Poorly fitted glasses cause particularly serious retardation.

4) Monocular individuals have less trouble with reading. This indicates that the major rôle in ocular defects in causing reading disability lies in disturbance of binocular vision.

5) Reading scores in terms of mental age expectancy give a significant correlation with eye function scores, while reading scores in terms of grade equivalents give practically no such correlation. The first type of score is a better measurement of the rôle of defective vision in reading retardation because the influence of intelligence is eliminated.

6) Reading retardation and eye abnormalities are related in about the same way throughout the various school grades except for a slightly greater correlation in the first two grades. This indicates the need of an early diagnosis and the advisability of prompt correction of existing eye impairment, particularly abnormal binocular vision.

7) There is no evidence, contrary to the common view, that school work increases the number or severity of the eye defects during the elementary grades.

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'CREATIVE' ACTIVITY IN CHILDREN

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Art and constructive activities of school children have shown very marked improvement within the last decade or two. So have practically all other phases of elementary-school work. However, there is in some quarters a widespread tendency to use the term 'creative' as applied to art as though it implied some mysterious unique factor above and beyond the known principles of learning, and outside of the scope of attempts at evaluation. The matter would seem to call for psychological analysis, and such analysis would appear to fall within the province of the psychology of learning.

Learning progresses by using what meanings and skills one has already acquired or, in case of the lack of such foundations, by explorations which must be of a trial-and-error nature in the early stages. The first time a child tries to draw a familiar object such as a man from memory, it is evident that his knowledge of the form of a man is vague and inaccurate. Recognition of an object when one sees it by no means implies ability to recall or to reproduce its form. It need not yet have been learned to that extent or in that way. Trying to draw a man is like the experience of an adult if asked suddenly to draw a map of the islands of the East Indies when the map can be recognized but not reproduced. One may be tempted to ask for an opportunity to look at the map again before indicating one's recall of it on paper. Yet by far the best way to learn the map of the East Indies is to draw it from memory after one has tried to notice the form and shape of the islands. Emphasis upon learning by recall has been found to be very much more effective than learning by emphasis upon re-reading. Learning is an active process, and activity of the kind called for is best guaranteed by making one's best attempts at recall before resorting to the copy again with a view to 'imitating' it.

Two methods of learning are here opposed or contrasted; namely that of expressing what one already has in mind as fully and adequately as possible, and on the other hand a resort to refreshing one's memory continually without any such persistent effort at reproducing what one should know already. The latter

is the kind of thing commonly known as copying, when applied to learning to draw common forms or objects. The matter is well illustrated in Fernald's[1] method of teaching children with total reading disability to learn to read. The child first gets acquainted with the form of the word to be written by exploring it or tracing it with his fingers. Then, without the word in sight, he recalls the shape of it and reproduces it on paper from memory. The learning process is one of getting the form of the word by exploring it, followed by attempts at drawing it from memory as soon as possible, with further exploration of the form only as needed, until the child has the shape of the word clearly enough in mind to write it from memory and, consequently, to read it.

BASIC PRINCIPLES IN LEARNING

The basic factors involved in learning are: First, readiness in the form of motivation or purpose. This implies that one has a goal in view, something in mind which one wishes to do. It is this aim which directs the process and determines the success or failure of the product. The second factor in learning is, of course, the activity of the learner. Learning is an active process, and one can learn only through one's own activity. Finally the product of the activity must be evaluated as approximating the goal arrived at, or as calling for corrections to make it better. Without this evaluation of the results of the activity there can be no guidance of future efforts, and no satisfying effect to reenforce continued efforts at learning. It is astonishing how much misunderstanding of the real significance of one or more of these three basic factors there has sometimes been in interpreting school learning.

With well-motivated practice in representing things in graphic form, including the attempt to express a meaning which he has in mind, the child makes rapid progress in art and constructive activities, especially if his efforts are rewarded by reasonably satisfying results or effects. Children have always liked to 'draw,' but a generation ago they received practically nothing in the way of psychological guidance on the part of the teacher in their efforts at drawing. What they did in school was to 'copy' a form which usually had no meaning for them. Therefore, the exercise was without real motivation, and consequently could

[1] Fernald, G., *Remedial Techniques in Basic School Subjects*, New York: McGraw-Hill Book Co., 1943.

have little or no satisfaction. Emphasis was upon the product from the standpoint of adult techniques and standards. In this way further attempts at drawing were discouraged rather than encouraged. But with tactfully guided practice as now given in harmony with sound principles of learning, children practice drawing a great deal, just as they practice reading a great deal, and learning in both is highly satisfactory.

DEVELOPMENT OF PURPOSIVE LEARNING

The earliest attempts of all kinds, whether in thinking, in interpretation, or in art and constructive activities, can well be called exploratory. Exploration must necessarily be prominent in an area which is largely new to the learner, that is to say, unexplored. A child of four who has never touched a piano before, but has listened to some simple tunes, may well illustrate the matter. The child is ready enough to try out the piano which he has seen adults play, and to call it playing the piano. Yet the result is not properly called music, not to mention 'creative' music. He merely manipulates the piano as he would manipulate any other object which has not been handled before. He discovers how hard one must strike the keys in order to make a sound, where to strike to get the high tones, the low tones etc. He must first come to differentiate the resulting tones, and to identify more accurately where and how to strike to produce them. He must remember and have in mind the desired tones in advance, and be able to strike them in succession.

'Creative' production implies, first of all, something that is purposive. In the matter of playing the piano, it, therefore, implies knowledge previously gained of tones, rhythms, tunes and the like which have previously been differentiated out of the first vague sounds which are heard, ability to remember and to recall them, ability to concentrate sufficiently to hold them in mind or variations of them, till they are produced. Finally, it implies evaluation of the result as in some measure approximating what the subject intended to produce, or as disappointing in the result achieved in terms of his purpose. Any voluntary or purposive activity thus implies previous knowledge of results achieved and use of it in more or less varied form. The baby who has had the experience of hearing his rattle bang on the floor after he has happened to throw it, soon comes to connect the sound

produced with the activity of throwing, and so with practice to be able to achieve the end (banging) voluntarily. Yet it must not be forgotten that the whole process is one in which the child learns through his own activity, as a result of analysis and synthesis, differentiation and integration, by which means-end relationships become gradually built up. Purposing thus becomes possible. Purposing is anticipation of ends by control of the means to the intended goal.

The same applies to the child's early activities in learning to talk his mother tongue. 'Baby talk' is an interesting and spontaneous variation from adult speech, though not a product to be called 'creative'. An attempt by the child to make a better articulation than he had ever done before might be so called, though it seems hardly appropriate to call it such unless the product is an improvement upon what is commonly produced, or is produced by a method that is superior to that commonly used. Doubtless it is well to distinguish between that which is intended to be an improvement, and that which is actually an improvement as far as commonly achieved product is concerned. It is, of course, the latter that is of interest in adult life. The intention, however, is of interest to the educator, in so far as it is indicative of an attitude which gives promise of effective learning and of ultimate production which makes for improved variations at later stages of learning.

IMITATION AS A FACTOR IN LEARNING AND 'CREATING'

The term 'imitation' also calls for interpretation, as it is used in senses sufficiently different to be somewhat confusing. To some it means slavish adherence to reproduction of what has already been done, with no intention on the part of the learner to attempt variations or interpretations of his own in the process. Such learning is much less active than it ought to be, for all learning should have the spirit of exploration, and capitalization of the results thus revealed. But an important consideration is whether the explorations are largely in 'blind alleys' from which wise guidance might have saved needless wasteful efforts.

On the other hand there are those who use imitation as applied to learning in a quite different sense. They have in mind precisely the point that it is folly to waste one's time exploring in blind alleys, when information as to what has previously been

learned would open up to one's view more promising fields for exploration. It is, therefore, advocated that they should follow or 'imitate' the lead of earlier investigators, and so find their way as soon as possible into the most promising fields which have come to be known. For example, it would be needlessly wasteful for an airplane designer to start his original creative efforts at the point where the Wright Brothers started, when so much territory in airplane mechanics has been surveyed since then. One should rather learn, appropriate, imitate, these past accumulations, before attempting to do creative work in any appropriate sense. Again, taking a course in principles and methods of teaching is intended to afford the prospective teacher a better opportunity to do good professional work, and to improve upon what is already common practice. Such 'imitation' is considered better than to avoid attendance at a Teachers College for fear that such experience may restrict one's own creative efforts. Aid and insight that may be given by appropriating the contributions of earlier workers is counted upon to aid the process of real creative work. This applies to guiding principles as well as to use of effective techniques.

CREATIVE ACTIVITY IN CHILDREN AS APPLIED TO ART

Unfortunately the work 'creative' as applied to the work of children, particularly in art, has come to be used by some writers in a vague uncritical way, with no clear idea of its implications. It would be well to evaluate the concept in terms of the principles of learning involved.

An earlier generation, by and large, was sadly lacking in its psychological insight, particularly with respect to art work of children in the schools. The product rather than the educative process was emphasized almost exclusively. Accordingly, children were expected to learn to draw by copying a drawing in view. Teachers of that age did not realize that this procedure was on a par with the extreme of verbalism in learning—repeating what was seen or heard without due consideration of what it meant to the child in terms of his experience. It was on a par with doing arithmetic by rule, without understanding what the problem really meant, or its relationship to a life situation familiar to the learner. It was altogether out of line with the accepted interpretation of the principle of exercise in learning as now under-

stood, that one learns the reaction that one makes, and that there can be little value in mechanical copying, when one should be expressing what one has in mind and striving to explore to get further meaning to express.

Fortunately, that dark age in educational practice has gradually been outgrown. Teachers now wish children to understand what they do, to express what they have learned in their own words, gestures, or other media of expression as in dramatization, art, constructive handwork, etc. Verbalism, copying what has little or no meaning to the copyist, following mechanically the directions of a dictator—all such learning has long since been banned as far as commonly accepted theory is concerned. School learning is now supposed to follow the guidance of an accepted leader who helps one to use one's own intelligence to best advantage. And the leadership of a teacher comes to be accepted largely because it has been found to point the way to profitable and enlightening explorations and productions. Yet there are those who in their enthusiasm for freedom of expression tend to go to extremes and to advocate a degree of freedom which surpasses all legitimate bounds. In extreme interpretations, the child's interests or whims are supposed to be followed to the exclusion of any real guidance of the process by the teacher or in terms of a course of study as outlined by a school system. Under such conditions individualism tends to run riot, and real progress in learning is hindered. After all there must be conformity to a great many things. A child must learn in due time to distinguish in his statements between events which actually happened and what he just made up. Even at best there is an unfortunate lack of conformity to what is true in most attempts at memory or reproduction of events as they occurred. Adult testimony shows a considerable degree of discrepancy as to details, even where the intention to conform to the exact truth is genuine. Extreme variation from reality is an indication of mental abnormality.

Conformity to reality has its place in most, if not in all, learning. Spelling should conform to the dictionary. The answers to questions in arithmetic, the interpretation of phenomena in science, and the like should be in strict conformity with the facts. In mechanical inventions conformity to reality and to what will work is the goal, and the value of the thinking or the original invention must be judged from that standpoint. It is not difficult to be 'creative' if creativeness means mere variation from the

standard; but if one chooses to be a radical, one must do so at one's own risk, and the path of the radical is likely to be a thorny one, unless one has tried out one's new theories very thoroughly in relation to all rival theories which have made some headway before.

Modern practice in art is in line with accepted practice in other areas of elementary-school work in starting with what children already understand, and in having them try to express something that they have in mind and wish to express. Rightly, too, the technique of expression is largely kept out of the picture at the outset, in order that the spirit of free, uninhibited expression will be forthcoming. One does not stop a baby from trying to express himself in speech, gesture or emotional response until the technique of vocal expression has been taught. The order of learning is rather that of starting with the vocalization that is there, using it as a medium of expression as best one can until, by trial and error at first, and by more purposive trials as experience is gained, the technique of correct speech is gradually attained. 'Baby talk' is likely to be present in some degree. It is a variation from the standard aimed at, and it is spontaneous, but one does not label it as 'creative' or glorify it as a mark of distinction, though doubtless most mothers read into the early babbling and talk of the baby much more than is actually expressed by the child. It is on a par with seeing almost anything one wishes to see in an outline, be it the moon, an inkblot, or what not.

So it is with the early drawings of children. The first attempts are bound to be trial-and-error scribbles, with little approximation to what, if anything, the child had in mind to represent. Observation of objects is most vague and undifferentiated at the outset. Attempts at representation are doubtless the best means of becoming acquainted with the form of objects, assuming that the objects themselves have been handled and seen. Yet to label the drawings as 'creative' with the implication that they represent something mysterious or unusually promising in the way of ultimate originality or talent, is to belie the facts, and possibly to court later disillusionment.

However, a consideration of most fundamental significance in all early learning is that of the attitudes engendered. Unless a child's learning activity is an attempt to express what is genuinely his own in meaning or form, and at the same time an attempt to reach out for more adequate and better meanings, the learning

process will not be advanced significantly. There should be an attitude of initiative, of willingness to try more things than the learner has been shown, and of venturesome activity in exploring all sorts of new and promising areas without undue leaning upon the guidance of others. Without such attitudes, learning lacks aggressiveness and approaches a degree of passivity which gives little promise of genuine acquisition or further use of what is supposed to be learned. Encouraging 'creativeness' in this sense in children's drawings is in conformity with sound principles of learning as applied in other fields by skillful teachers. But there is no justification for a 'creativeness' which gives license to all sorts of freakish forms of expression which are naively supposed to spring out of nowhere, and to be immune to all attempts at evaluation on the part of the child himself or his teacher. The purpose or meaning to be expressed may be vague, but it has no chance of becoming clearer except by some degree of appraisal of how well the attempt fits the purpose, and of how further attempts should be shaped accordingly. Evaluation need not be in terms of techniques, nor should it ever be in terms of standards which are far beyond the level of appreciation of the child at the time.

Evaluation is always an important part of the educative process. It should be, however, in terms of the purpose aimed at, and in view of the limitations of the child in the way of techniques of expression. To decry evaluation of the product by either the child himself or his teacher would imply that there is no effect, no estimate of the child's effort towards attaining his goal. In that case learning is at a standstill if not negative in its consequences. The child learns by coming to find out in what respects his efforts can be more successful in attaining his purpose. If the teacher is able to give him enlightenment which results in his being able to achieve results that he later sees to be better, he gets the thrill of achievement, and is encouraged to continue such activity and learning. But evaluation there must be if learning is to continue. The only question is as to whether the evaluation is entirely the pupil's own, or his own supplemented by the suggestions of the teacher who should be a competent guide to the learning process in this respect.

Dictation in learning is bad because it defeats the purpose of the learning process by ignoring the principle of readiness. The child must start from where he now is if progress is to be made. The

new must be an outgrowth from the old and the known. Dictation assumes that responses are available when they may not be available in terms of genuine activity, understanding, or techniques. The result is likely to be the development of an attitude of dislike for the meaningless performance which is thereby doomed to failure because no satisfying effect is forthcoming.

Art education has made excellent progress both in selection of curricular materials within the range of child interest and understanding, and in scope of application to the life situations of which the child is a part. It has made excellent progress in the psychology of learning as applied to art expression. But it is misleading to claim a form of 'creativeness' that is unique to art. There is call for just as much interpretation, self-expression, originality, initiative and the like in at least phases of most other school subjects, though the feeling phase varies from subject to subject, and the degree and kind of conformity and of evaluation called for may vary quite widely.

Yet all along the line, emphasis is rightly put upon the genuine activity of the learner as the prime factor in all learning, with the implication that there is such motivation that the learner is activated by some purpose which he has accepted as his own, and that he is alert to results of his efforts in terms of the purpose in view. If the effect is in some degree satisfying and worth while, interest is in so far increased, and further learning is the result. But in so far as there is no such aggressiveness, and the effect is accordingly of no consequence to the pupil, if indeed not positively distasteful, future learning in that area may receive a set back instead of making progress.

It is refreshing to get childish interpretations of stories, events, people, and the like which are their own, even though they are naïve. The same is true of children's expression in art work of various kinds. If 'creative' work of children means an attempt at expression of meaning which is their own rather than expression which has little or no meaning because it is a slavish reproduction of the form of what has been made by another, that is well and good. But if 'creative' work in art is intended to mean that it is a mystical, unique, inspirational kind of activity which has no counterpart in other areas of learning, or that it is a product which is above and beyond the scope of evaluation, then it is misleading and confusing.

TESTING IN THE ARMY AND NAVY

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World War I marked the beginning of a testing movement scarcely short of phenomenal in its effect upon educational and psychological measurement. Testing, however, actually rendered little service to the personnel of the Army and Navy in the selection and classification of recruits. Measurement was primarily confined to the quickly constructed and administered Army Alpha and Beta tests, whose results were supplemented to some extent by performance tests. The Army tests given to recruits in various branches of the service, results of which were classified according to factors such as age, race, occupation, and rank, made their greatest contribution in the form of published reports after the war was over. Assuming that these tests could have been dependably used in classification and placement, the war ended before the full possibilities of the projected testing program could be explored.

During the period between the wars, however, psychologists had opportunity to explore the possibilities of measurement. It was a period in which tests and measurements multiplied in number and type. In general, it was a period of experimentation with little effort to standardize and perfect even a small fraction of the tests actually constructed. But during this period of experimentation, psychologists gained valuable knowledge concerning the applicability and validity of various types of measuring instrument. Consequently, even before our active participation in the present war, psychologists had already made plans for contributing their knowledge and service to officials of the armed forces. Army and Navy personnel specialists were also planning their programs to make use of tests as a means of selecting and classifying recruits.

Utilization of tests in the Army may be made clear by indicating the part played by measurements as the prospective soldier passes through various steps of induction.[1] The soldier, before he is actually a recruit, takes at the Induction Center a number of

[1] The *Psychological Bulletin* reports periodically the policies and practices of the Army personnel. For official information, the reader is referred to the January, February, March, and April numbers, 1943.

simple literacy tests to determine his ability to read and write. If he has a language difficulty, or is illiterate, he is given a Visual Classification test as a means of determining his fitness for military service.

Having passed his test at the Induction Center, the soldier is then sent to one of the thirty or more Reception Centers, where he is given a General Classification Test which provides a fairly accurate index of one's ability to learn. Scores on this test are classified into broad categories, ranging from I to V in descending order, depending upon efficiency. Each soldier while there also takes a Mechanical Aptitude Test and a Radio-Telegraph Operator Aptitude Test. Because of the highly technical nature of modern warfare, the mechanical aptitude test may reveal valuable information with respect to placement of men in various types of specialized mechanical work. The Radio-Telegraph Operator Test is also considered important because of the urgent need for large numbers of persons who can qualify for the Army's communication service.

Perhaps the most significant step in classification at the Reception Center is the soldier's personal interview with one of the Army's staff of personnel specialists. This specialist during an informal discussion collects a vast array of data such as previous work experience, educational background, specialized interests, and qualities of leadership. These data, together with test scores mentioned above, are entered upon each soldier's Qualification Card, a card which closely resembles the permanent record card now used in the schools. Data of this standardized card constitute a complete record of the soldier during his term of service, and are continually kept up to date as he passes from one type of service to another.

After a soldier has been tested and interviewed at one of the Reception Centers, he may be sent to any one of the various training units to receive specialized training for a designated time. A large number of these men are now being sent to Replacement Centers in preparation for specialized branches of the service, such as Engineer Corps, Infantry, or Signal Corps. Throughout this specialized training program, testing continues to assist personnel officials in the selection and classification of men for various types of service. The Army is now using approximately seven different classification tests, a half dozen

different aptitude tests, a wide variety of achievement tests, five trade knowledge tests, and approximately thirty technical examinations classified under Warrant Officers Examinations, the type and extent taken by any person depending upon the kind of service.

Little information is as yet available concerning the Navy's personnel policies; its specialized training programs are sponsored by many universities. The University of Colorado, for example, now sponsors five Naval Training Units. These units, arranged roughly in the order in which they were established at the University are: (1) Naval ROTC Unit, (2) Radio School, (3) Pre-flight Training, (4) Japanese Language School, and (5) the V-12 Program.

The Naval R.O.T.C., one of the first units to be established at the University during the present emergency, is designed to provide training in naval subjects for a group of selected students, who will also carry forward work in university subjects preparing them for civilian life. Although the program is sponsored by the Department of Naval Sciences and Tactics, subjects are so selected as to apply toward undergraduate degrees in the Arts and Sciences.

Candidates for the R.O.T.C. are selected from either high-school graduates or those who have already begun their university work. They are selected principally on the basis of physical tests, scholastic standing, and performance on a general psychological examination. This psychological examination consists of four parts: (a) mathematics, (b) vocabulary, (c) block tests, and (d) multiplication. Inasmuch as many factors are taken into account, only a few candidates are eliminated by the test. Psychological test results apparently play no part in classification and placement of students after they have been accepted as candidates for the school.

The Radio School enrolls students from the Reception Center at San Diego, who are approved for special intensive training in radio telegraphy. These students range in age from seventeen to thirty-three with a median age slightly above eighteen years. Their education ranges from the ninth grade to two years in college or university, with a median of approximately the eleventh grade. Formal screening tests are not used in selecting these subjects for this highly specialized type of training.

The course, which is limited to sixteen weeks, includes radio operating, typing, radio theory and naval procedure, with greatest emphasis upon radio telegraphy and typing. Each student is expected to attain a definite degree of proficiency before he graduates as a Seaman of the Third Class. Achievement tests, as such, are not administered during the training program, but objective day-to-day and week-to-week records are kept for each student, who is motivated to maximum efficiency. Each student knows that in order to graduate from the school within the sixteen-week limit he must be able to decipher twenty-two words per minute of the Morse International Code, and type at the rate of forty words per minute. A few students who are unable to meet this standard are classified as 'strikers', but are still able to serve the Navy in some specialized capacity. This intensive training, with a view to attaining maximum efficiency within limited time, constitutes one of the most rigid and exacting testing programs that could possibly be devised. Naval officials generally agree, however, that a psychological test designed to measure learning ability in this specialized field would be a means of preventing much wasted effort, time, and money now spent in providing training for those students who cannot attain the required degree of efficiency.

The Civilian Pilot training program, which has been sponsored by the University since 1941, until the late Fall of 1942 administered five tests, one of which was a modified form of a 'general intelligence' test emphasizing quickness and alertness of response; one a mechanical aptitude test; and the other three designed to measure aspects of personality and attitude. These tests, which were developed by the National Council on Research under the supervision of Jack Dunlap of Rochester University, were administered widely during 1941 when they were standardized and validated. With the transfer of this branch of service to the Navy, however, the administration of these tests has been temporarily discontinued.

The Japanese Language School, a unique unit on the campus, does not administer entrance tests, but selects its recruits from college students who rank near the top in scholastic achievement, not a few of whom are candidates for masters' or doctors' degrees in their respective fields. Many of these have majored in languages, and a few have resided in Japan. Students are taught

principally by highly educated American-Japanese, assisted by some Americans who have lived in Japan or who are proficient in the Japanese language.

The training program consists of meeting in small classes with instructors from early morning until late afternoon, six days a week through a training period of an academic year. Officials of this school do not administer entrance tests, but their method of selection insures a high degree of competency. Achievement tests are administered periodically as a means of measuring consistency of progress. Much time and effort are spent by the instructors in constructing a final comprehensive examination of such length and complexity as to insure efficiency at the time of graduation. It should be stated, however, that because of the wide range of abilities manifested in mastering the Japanese language, it is becoming increasingly evident that a language aptitude test, stressing the complexities and peculiarities of the Japanese language, would be helpful in selecting candidates, even in this highly selected group.

The Naval V-12 program, the most recent unit to be sponsored by the University, is designed to provide essential college training for various types of Naval officers, with emphasis upon science and mathematics as applied to naval practices. Candidates take general classification tests stressing learning ability and aptitude. supplemented by special achievement tests in science and mathematics. Test scores, together with many other types of data such as personal history, occupational experience, and educational background, are used by a committee in making final selection of applicants. Members of the committee are a Naval officer, an educator, and a civilian, who, on the basis of the data described above, are responsible for selecting candidates. The program parallels closely the various curricula of the University, except that mathematics and sciences with direct bearing upon naval needs are stressed. Students selected remain in the University for varying periods, depending upon the urgency of the need for their kind of service as the war proceeds. In the main, these students prepare themselves for certain technical positions, such as engineers, technicians, and physicians.

Perhaps the most significant conclusion that may be drawn as a result of this brief survey is the fact that tests and measurements are effectively used in the selection, classification, and placement

of men in the armed services. Preparations for use of tests were already being made before entrance into the war; and since our entrance, Army and Navy personnel specialists have been eager to use every promising testing instrument as a means of quickly utilizing the manpower of the country.

It appears that tests which stress potential learning ability will become increasingly useful as the results of tests are analyzed. The urgent need for persons who can quickly learn and adapt themselves to the requirements of specialized jobs makes imperative the use of any instrument which will insure even approximate predictions of performance. This is not to say that other types of test are not valuable or even necessary; but certainly for many activities, tests which stress measurement of potentiality and aptitude will make direct contributions. The Army and Navy are using a variety of other tests, including tests of personality, attitude, traits of leadership, in addition to standardized achievement tests. Although tests representing these types may be conceivably used for any group, it may be surmised that achievement tests will be stressed to a greater extent in the case of men sent to university training centers for professional and technical training. For those who seek commissions in either the Army or Navy, tests of personality and traits of leadership will be emphasized. In brief, the types of test stressed for any particular group will depend upon the kind of service.

The use of tests in the selection and classification of men in the Army and Navy marks the beginning of a new chapter in the development of applied psychology. Because of opportunity for experimentation in the use of a variety of tests in many situations, the results should find wide application in the fields of business, education, and industry. After the war, psychologists will have a wealth of data upon which to make predictions for various types of job and vocation. Perhaps the most significant contribution to the field of applied psychology will be found in the reports of success in matching abilities and jobs.

Results of tests of physical and mental fitness during this war, as in the last one, will modify educational policy and practice. These tests are already revealing evidence concerning the efficiency of the schools, the full significance and extent of which will not be known until the war has ended, and the results have been made public. But regardless of results that may be made avail-

able later, educators, during the years immediately preceding our entrance into the war, were being forced to demonstrate to a dubious public the achievements that the newer education was supposed to foster. The war, coming at a time when educators were already engaged in a program of evaluation, accentuated the demand for more thorough evaluation of schools. It is likely that the war will mark the passing of a period of experimentation in education.

Finally, this emergency has made emphatic the need of accuracy and efficiency for those who serve in industry as well as those who serve in the armed forces. Consequently, testing in the broader sense is not limited to standardized tests, but may properly include rigid standards of performance in all phases of activity, including day-to-day proficiency on the job, output in relation to time and effort, and specificity and accuracy of response in any task including the mastery of subject-matter in school and college.

BOOK REVIEW

ROGER G. BARKER, JACOB S. KOUNIN, and HERBERT F. WRIGHT, Editors. *Child Behavior and Development.* New York: McGraw-Hill Book Company, Inc., 1943, pp. 652.

Using the sensible methods of getting nominations of significant investigations from members of the Society for Research in Child Development, these editors then asked the researchers themselves to describe what they had done. The result is a substantial volume of six hundred and fifty-two double-column pages in small print in which thirty-five investigations are described for the purpose of bridging "the gap between the classroom and the laboratory and clinic by extending the procedures, findings, and attitudes of the scientific study of child behavior beyond the limited circle of those engaged in research." In general the descriptions are excellent and include a statement of procedure, a summary of the obtained data, and an enumeration of conclusions. The authors include such distinguished students of child development as: L. K. Frank, Dorothea McCarthy, F. N. Freeman, L. M. Terman, Willard C. Olson, Arnold Gesell, Beth L. Wellman, Jean MacFarlane, Arthur Jersild, Lois Murphy, Roger G. Barker, Kurt Lewin, Harold H. Anderson, Carolyn Tryon, Harold E. Jones and Wayne Dennis.

The greatest weakness in the method employed by the editors in order to identify significant researches is that undue emphasis seems to have been placed upon recent studies. Other things being equal, these recent studies are, of course, the best studies; but other things are not always equal because persons studying problems of child development at any one time tend to concentrate their efforts in certain areas. The consequences of this concentration struck the reviewer as being rather serious. It resulted, in the case of the volume being reviewed, in the inclusion of: (1) a large number of researches describing the personality development of children, (2) another large group having to do with mental testing and intellectual growth, (3) a very small number of studies pertaining to physical growth, and (4) an almost complete exclusion of investigations that have to do with classroom or school learning. Even though it is fair to admit that this latter type of investigation in the past has been indulged in far too frequently in terms of its relative importance, there would

seem to be little reason for going to quite the opposite extreme and paying no attention in a book of investigations of child development to studies of the way children become familiar with the facts and generalizations and principles that are commonly taught under headings like arithmetic, spelling, history, foreign language, mathematics and science.

As is usually the case with a symposium, the present volume gives little evidence of integration and the reviewer is somewhat fearful that beginning students of child development will find it too formidable and scientific and weighty. Each research is a separate and somewhat technical study. Frank's initial chapter on "Research in Child Psychology: History and Prospects," provides some frame of reference, but there is no final chapter in which the 'big ideas' or principles that were implied or made explicit in the proceeding researches, were elaborated upon. Under the circumstances which surround college learning at present, however, it is probably just as well that this final chapter was not written. Had it been, the likelihood is that many students would have gone to it first and memorized the generalizations and principles rather than attempting to arrive at them inductively as a consequence of becoming familiar with the individual researches.

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